Outdoor Classroom Design Guide

BOSTON SCHOOLYARD INITIATIVE

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About this Design Guide

This outdoor classroom design guide outlines concepts that the Boston Schoolyard Initiative has refined over the years. A key to encouraging acceptance and use of outdoor classrooms in Boston’s urban public schools has been to connect educational concepts and required curriculum to the opportunities available in the outdoor classroom.

The community-based planning and design of BSI projects draws from the menu of components shown on the following pages. Existing site conditions are taken into consideration, along with the specific needs of each school and the surrounding neighborhood. Each section highlights specific areas or elements that may be used in the design of an outdoor classroom. Accompanying photos illustrate examples of these design concepts. The checklist at the end is a tool for reviewing final plans.

We hope these ideas will inspire creative outdoor classroom projects in communities across the globe!
“Imagine a classroom with the sky for a ceiling and the earth as a floor. This classroom without walls is bustling with activity as young scientists explore the world of bugs and leaves, mathematicians measure rainfall, count seeds and graph their garden’s growth, dramatists rehearse their play on a windy stage, artists sketch shadows and light, and linguists name the landscape with a thousand words. The schoolyard is just a hop, skip, and jump away.”

- Kirk Meyer
  Founding Director, Boston Schoolyard Initiative
What is an Outdoor Classroom?

The outdoor classroom (OC) developed by the Boston Schoolyard Initiative (BSI) has a common set of areas and elements developed with input from teachers and design professionals to maximize opportunity for hands-on teaching and learning. Each OC is different in layout, based on the existing site conditions and design choices. The outdoor classroom is a basic educational resource, like a library or a computer room. Teaching and learning are served best when an outdoor classroom is uniquely designed for the needs of a particular school. The design should make the outdoor classroom’s use and enjoyment transparent both for those familiar with teaching and learning outdoors, and for those who are new to a schoolyard outdoor classroom.

Traditionally, outdoor classrooms were thought of as amphitheaters or a ring of stones. The Boston Schoolyard Initiative has developed a new model that is an interactive place of discovery, providing the opportunity to engage with all curriculum areas — including science, math, language arts, social studies and art. The outdoor classroom provides a living laboratory for year-round full-class and small group instruction.

Through professional development programs and the adaptation of traditional educational materials for use in the outdoors, BSI supports the Boston Public Schools curriculum. These resources include Science in the Schoolyard Guides to taking BPS science kits outdoors, developed in partnership with the BPS Science Department, and Outdoor Writers’ Workshop, developed in partnership with the BPS English Language Arts Department.

The outdoor classroom adds a whole new dimension to public education. In our urbanized society, the outdoor classroom is a needed resource that helps bring the natural world into student’s daily lives.
Understanding of the ways that students and teachers use an outdoor classroom helps guide and enrich planning and design decisions.

Class Use

- **Meet** at one spot as a full class or group (to get directions, and debrief following an activity)
- **Watch** teacher demonstrations, (gathering around a table, an open space, work area)
- **Work** in small groups dispersed throughout Outdoor Classroom of Schoolyard (typically 4 groups of 3-5 students)

Student Use

- **Search** for examples (organisms and their habitats; seed varieties; germinating seeds; examples of wood; human uses of stone; evidence of erosion and deposition; simple machines: inclined plane, wedge, screw, lever, pulley, and wheel and axle).
- **Collect samples** (insects, rocks, wood, soil, etc)
- **Test** the properties of materials (which materials attract magnets, which don’t? Does wood absorb water? Is it a solid or liquid? Is it wood?)
- **Observe** details (behavior of living things; differences between plants)
- **Collect data** to look for change over time (how many trees still have leaves on them?)
- **Sort and count and measure** items found in the outdoors
- **Work hands-on** (sift soil for different sized particles: pebbles, sand, silt, clay; pour water on different slopes; build stream tables to test erosion; make papier mache)
- **Take Notes** on what they observe (how water behaves on different slopes; how water behaves on different ground surfaces; organisms found in winter; signs of winter, signs of spring)
- **Listen** to the variety, pitch, source, and duration of sounds
- **Compare**: how sound travels through solids, aids, water and air; magnetic attraction of bronze, steel, aluminum, wood; structures and behaviors of different organisms; plant propagation by seed, root, bulb
- **Write** personal reflections, close descriptions, fictional stories, nonfiction, persuasive essays, letters, poetry
- **Sit in one’s own special place** to observe, write, contemplate; *experience* being alone
Outdoor Classroom Components

AREAS AND IDENTIFYING FEATURES

- Gate and perimeter fence – safely defines the place
- Gathering area – seating for a full class
- Individual & small group seating – logs, stone or wood
- Pathways – primary and secondary circulation
- Urban meadow – native grasses and wildflowers
- Sample woodland – trees, shrubs and herbaceous plants
- Lab area – work tables and storage
- Landscape forms – a small hill, berm, or rain garden
- Armature – structure to support teaching tools

ELEMENTS AND TEACHING TOOLS

- Natural materials to investigate – pebbles, sand, soil
- Scientific tools – wind instruments, thermometers, rain gauges, rulers, sundials, levels, pulleys, etc.
- Animal habitat – fallen logs and flat stones
- Signage – site map, plant ID labels, student displays
- Planting beds – edible & experimental gardens
- Writing surface – chalk board or white board
- Work surfaces – tables, rocks, stumps
- Compost bin and leaf cage
- Water source

Designing for Maintenance and Sustainability

Actively used outdoor spaces require maintenance — just as indoor spaces do. Planning for maintenance is essential at the beginning of the design process. Some daily maintenance tasks can be taken on by students as part of the educational process and become a way to learn about stewardship. Other maintenance resources include baseline maintenance by the school custodian, seasonal landscape maintenance by a schoolyard crew, work by a schoolyard friends group, volunteers, and trained summer youth work crews. Proper selection of building and plant materials is critical. Materials must meet multiple criteria: high educational value, low maintenance, suitability for the site, and sustainability.
Urban Outdoor Classroom - Conceptual Layout

- Defined areas & elements
  - Individual and group seating on tree stumps & boulders
  - Primary circulation path
  - Secondary circulation paths
  - Perimeter fence

- Special entrance gateway

- Water source
- Lab & experiment area with armature, teaching tools, work table, storage
- Student planting beds
- Sample woodland
- Circular gathering area
- Urban meadow
- Area 1800 - 2500 + sq. feet

North
South
Description and Purpose

The outdoor classrooms are fully enclosed by fencing. The fence safely contains student activities, which allows for free exploration and assists teachers with classroom management. An enclosing fence also protects the site from vandalism and prevents its use by dogs.

The gateway defines the outdoor classroom as a special place for teaching and learning, and a unique living habitat in need of care and protection. A gate that is designed to slow down a student’s pace upon entering the outdoor classroom signals a transition away from the recess or play space.

Design Considerations

❖ Consider appropriate fence height.
❖ Material choices should be functional, durable, and sustainable.
❖ Consider a special gateway that reflects the theme of the schoolyard.
❖ Include a lockable gate to prevent unwanted uses during out-of-school time.
❖ The gateway may be an artwork opportunity.
❖ Consider integrating new fence with existing schoolyard fences to make full enclosure.

Illustrations

Chain-link fence and custom seed pod shaped gate (with lockable panel)

Craftsman gate with wrought iron hardware
Illustrations

Outdoor classroom fence and gateway - natural log posts with milled lumber

Entrance ramp and fence to outdoor classroom with student tile artwork

Boundary fence: visually minimal welded steel wire

Bud shape arch (trellis) on chain-link fence and gate

Seed gate, swings open for full access

Outdoor classroom - fully enclosed by black coated chain line fence with custom lockable entrance gateway

Rustic wood fence

Raindrop shape gateway, painted steel

All season use
Description and Purpose

Permanent seating made from natural materials such as logs or boulders can be placed in the outdoor classroom in a variety of configurations.

A gathering area for a full class provides a clear location for teachers to assemble and orient students upon entering the outdoor classroom. Dispersed seating allows small groups to work together and individual students to work independently.

Design Considerations

- Seating for full class for short term use (3-10 minutes) may be densely packed.
- Consider locating a white board or other writing surface in the gathering area.
- Include dispersed seating: seats for individual students, and clusters of 2-3 seats, in a variety of locations throughout the site.
- Dispersed seating should allow students to choose to focus on different landscape features, find sun or shade, and have a variety of engaging experiences.
- Locate seating directly adjacent to a pathway, and place to avoid conflict with planted areas.
- Provide various seat heights - consider age of school population.
- Consider whether to make seating movable for flexibility, or fixed in place.
- If logs are movable they must be wider than they are tall for stability.
- For log seating, use durable wood species (black locust or cedar).
- For boulder seating, vary color and rock type for educational interest.

Examples and Details

Seating for small group project work, log sections installed close to path so path becomes work surface as well

Individual seating on low boulder surrounded by irregular paving stones
Seating and Gathering Area

Illustrations

Closely packed seating on log sections

Section of old tree offers engaging seating option

Movable stumps provide seating and flexible work surfaces

Stump section provides warm seat for winter outdoor work

Full class gathering area on permanently installed durable locust stumps
Description and Purpose

Pathways clearly guide students throughout the outdoor classroom to access all areas and elements. They separate foot traffic from planted areas, protecting vegetation.

Primary pathways should be accessible to students of all abilities, and provide continuous circulation with no dead ends.

Secondary pathways are smaller in scale and encourage meandering travel and discovery, and optimize immersion in nature.

Design Considerations

- Primary pathways from entrance to gathering area and work areas should be a minimum of 36” and wheelchair accessible.
- Secondary pathways show a clear contrast in materials and scale to primary pathways.
- Use surface materials in planting areas that are distinctly different from mulch to provide a cue where to walk in order to protect plants.
- Consider a range of surface materials - fieldstone, bluestone, slate, recycled plastic lumber, asphalt with natural colored stone chip-seal top coat, fibar with edging.

- Concrete stepping stones can be cast with imprints of leaves or other natural items.
- Be aware of existing desire lines.
- Incorporate green practices where possible - permeable pavers, locally sourced materials, on-site water run-off management.
- Log slices decompose over time and are not durable enough for use in pathways.
- If school has high vandalism risk, consider permanent installation of paving stones.
- Consider mounding the earth underneath pathways to add topography to the outdoor classroom.

Illustrations

A variety of surface materials adds interest and directs traffic flow

Bold oval-shaped primary circulation path, with secondary stepping stone paths into meadow and woodland
Illustrations

Primary circulation - chip seal asphalt secondary circulation - stepping stones

Fibar (engineered wood fiber) is a renewable low-cost walking surface. Cast concrete walkway with integral red color in background

Close up view of cast concrete walkway with leaf imprints

Primary circulation - crusher run - a mixture of stone dust and larger irregular aggregate

2’x2’ concrete pavers stained mottled brown through a new urban meadow

Wood decking provides primary circulation and gathering area

Open cell permeable asphalt paving

Stone inlay in permanent concrete setting

Chip seal added to existing asphalt base
Description and Purpose

The urban meadow is a distinct area made of grasses and flowering perennials typically found in country fields and urban lots. It is a habitat for birds, butterflies, and other insects, and provides an opportunity for students to use all senses while immersed in an un-manicured, natural environment.

The meadow is a hands-on laboratory for students to collect seed pods, pick flowers, investigate parts of a plant, listen for birds, count insects, and see examples of seasonal change and long-term ecological dynamics.

The meadow can be used for building vocabulary, practicing math and writing skills, improving observational skills, as a catalyst for reading or art, and to inspire an appreciation for nature.

Design Considerations

- Design as a large mass island (500 sq. ft or more) rather than a bordering strip bed.
- Include meandering pathways and dispersed seating to encourage immersion within the meadow and to find places to sit and observe.
- Include flat stones and decomposing log slices for students to turn over and find worms or bugs.
- Mound and shape landscape to create topography that increases discovery and engagement.
- Site for full sun exposure.
- Plan for plantings to be cut back to ground annually in early spring before new growth.
- Ensure good soil drainage or consider a rain garden design in low areas.
- Use native and low water-use plantings.

Illustrations

Early summer lupine bloom

Early fall grasses and sunflowers
Illustrations

Schoolyard meadow - year one

Schoolyard meadow - year two

Queen Anne’s Lace and Black-Eyed Susan

Tall miscanthus grass

Urban meadow in the fall

Bug hunt under a rock

Milkweed seed pods

Immersion in nature

schematic cross section

main circulation pathway

mix of low & high plants

18” - 24”

12’ - 15’ +/-

Urban Meadow on bermed landscape

flat rocks & log slices

logs for sitting

boulders for sitting

grasses (provide height)

first year recommendation - plant a mixture of full size plants with seeded areas in between

secondary meandering pathways

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Outdoor Classroom Design Guide
Description and Purpose

The **sample woodland** is an area planted with a diversity of understory vegetation typically found in woodland ecosystems including ferns, shrubs, and small trees. As with the urban meadow, the sample woodland provides a protected natural habitat for study across multiple disciplines.

Design Considerations

- Include a diversity of plants: deciduous, evergreen, cone-bearing, etc.
- Introduce a range of plant characteristics (form, structure, leaf type, seed type, bark type, flowers) to stimulate curiosity.
- Select plants to provide interest throughout the seasons (winter blooms, berries).
- Design as a large mass island (500 sq. ft or more) rather than a bordering strip bed.
- Plant trees and shrubs in clusters, rather than as individual specimens.
- Woodland may be located under existing larger trees - use shade plants as needed.

- Provide topographic variation to maximize potential for engagement and exploration within a small area.
- Include secondary pathways to encourage student exploration and multiple seating options to encourage seated observation.
- Include flat stones or log slices for students to turn over to find worms and bugs.
- Provide heavy mulch layer.
- Green practices: use native plantings, and design so that run-off water replenishes beds.
- Place log sections near pathways so students may observe the process of decomposition. Logs in direct contact with soil or mulch will break down to provide habitat for insects.

*Immersion in nature, only a few steps from asphalt schoolyard*  
*Stepping stones of rough fieldstone and stumps for seating*
Illustrations

Understory shrubs: fothergilla, witchhazel, summersweet

Thick much layer and forest litter

Planting types and landscape details

Witchhazel, fall bloom
Cone-bearing trees
Students observe insects in rotting log sections
Description and Purpose

The planting beds are a dedicated place for hands-on gardening. Food production can be tied into nutrition education, as well as science, math, and language arts.

Planting beds could potentially be used by community members in the summer.

Design Considerations

- Site beds close to water source and for full sun exposure.
- Use construction materials that are safe for edible crops.
- Consider the school’s capacity for maintaining a garden when deciding on the size and number of beds.
- Allow enough surrounding space to accommodate a full class.
- Consider adding a wide top edge for sitting, working, or note-taking.
- Locate storage of tools and supplies nearby.
- A root viewing window with a sliding cover allows for subterranean observation.
- Vary heights of beds to accommodate students of different ages.
- Size range: 3-4 feet wide x 4-8 feet long. Bed height based on age of users and to provide protection of plantings, range: 6”- 30” high.
- Consider designs to accommodate wheelchair access.
- Soil specifications: provide loose loam soil mix with 25% or more organic compost content.

Illustrations

*Planting beds surrounded by crushed stone and recycled concrete paving*

*Movable planting beds on industrial rollers*
Illustrations

Root view window (laminated safety glass) with sliding cover

Wide planting bed edge becomes class work surface

Recycled plastic lumber raised bed

Low raised bed of rough 2 x 4’s

Water source, with below frost level shut off valve

Season extender - simple top made with plastic pipe and sheet

Spring seed starts for planting out in summer
Description and Purpose

The lab and experiment area is a multi-functional area for hands-on activities. Students can explore and test physical science concepts, record weather, and work with various materials.

The lab area includes a work table and a lockable storage area. Armature is used to mount teaching tools such as wind vanes, thermometers, rain gauges, sundials, pulleys or metal panels that demonstrate magnetic properties. A white board or chalkboard may also be affixed to the armature, as well as boards for the display of art projects. Single wooden poles may also be dispersed throughout the outdoor classroom to hold signs, thermometers, birdhouses, etc.

Design Considerations

- Allow enough space for a full class to circulate around work stations.
- Build area with permeable surface and good drainage.
- Use stainless steel or galvanized hardware.
- Consider storage cabinet with wire mesh sides allowing contents to be visible, which helps deter vandalism by showing nothing valuable is inside.
- Locate near water source and use a key to protect hydrant from vandalism and unauthorized use.
- Consider locating in proximity to garden beds to maximize use of one water source.
Illustrations

Wind vane, typically mounted on the armature, or a separate pole 8’-10’ high

Thermometer and meter stick

Model of green roof, demonstrating difference of water run off rate with and without planting materials

Shallow water basin, carved into sandstone rock - supports habitat, indicator of rainfall, winter experiment area

Framed experiment and digging area

Lockable storage unit, with open mesh sides for clear visibility

Schematic cross section
Description and Purpose

The outdoor classroom is an ideal place to provide models of responsible use of resources and to display green construction concepts.

Water management can be taught through the use of rain barrels, rain gardens, and the use of dry stream beds to manage storm water.

Solar panels can be used to power water pumps or other water features. Leaf cages are a low-maintenance alternative to compost bins for demonstrating the process of decomposition.

Sample green roofs can be made by planting sedums and low grasses on the top of storage sheds to demonstrate a green building practice.

Design Considerations

❖ Use locally sourced materials throughout the outdoor classroom where possible.
❖ Design for consideration of long-term maintenance.
❖ Consider low water requirements in planting choices and locations.
❖ Use non-toxic materials for all structures, fences, and planting beds.
❖ Provide stable surface along sides of dry stream bed for solid footing and safe use.
❖ Consider leaving one half of sample green roof unplanted, to illustrate rapid rain water runoff.

Illustrations

Urban meadow plantings, once established do not require watering
Sedums for green roof construction
Rain garden, first year with schoolyard runoff
Rain garden, second year with planting established
Solar water pump
Recycled concrete walkway
Description and Purpose

A series of teaching tools including a wind vane, thermometers, sundial, rope and pulley, sample materials, water collection basin, etc., help to support specific curriculum taught in the outdoor classroom.

Signage communicates educational concepts, provides cues to use and behavior, and assists maintenance of the outdoor classroom. A sign at the gate indicating the educational use helps differentiate it from play areas. Signs made by students identify the space as child-centered. Temporary signs may be made of recycled materials or laminated paper. Consider a bulletin board for posting regular updates.

Design Considerations

- Consider location and type of support poles for teaching tools to be mounted on.
- Coordinate teaching tools with science curriculum.
- Use durable and waterproof materials for permanent signs.
- Locate signs at a height accessible to all ages.
- Consider multi-lingual signs to enhance secondary language skills.

Illustrations

Wind vane mounted on 9’ x 6” x 6” post

Display of sample metals

Sundial on post 6” x 6” x 30” high

Thermometers mounted on all four sides of post

Writing stand, 28” high x 12” x 18”

Drip irrigation from cistern

Rain gauge

Water basin, 3’ x 3’ x 3” deep

Informational sign

Site map, 24” x 36”

Vegetable garden plant ID, in English and Spanish
Description and Purpose

Schools may add other small scale features to the outdoor classroom in order to enhance its use as an educational space. The addition of features over time allows multiple generations of students, teachers, and parents to feel ownership over the space. Added features may include habitat for birds, musical instruments, artwork, markings that assist students in observing, measuring, sorting, etc. A small labyrinth or maze can provide an calming, repetitive experience that can help focus individual students.

Design Considerations

❖ Locate bird houses near a water source.
❖ Be mindful of sound levels and neighbors when placing musical instruments.
❖ Consider the long-term maintenance needs of an art project and how it will be cared for after the artists are not longer at the school.

Illustrations

- Nesting box on narrow pole to protect birds from predators
- Wooden xylophone
- Measured grid painted on table top for counting and sorting
- Bird houses may be made and decorated by students
- Small labyrinth, carved stone 18” diameter
- Viewing Frame one meter square, provides a defined reference to focus observation and a place for recording comparative changes over time

❖ To enrich the use of the Outdoor Classroom teachers may also provide manipulative materials from the classroom or home including: sticks, gravel, blocks, fabric, small containers, digging tools, art making supplies, etc.
Use this checklist during the design and planning process, and for design review.

Outdoor Classroom Elements and Areas

ORGANIZING ELEMENTS AND CLASSROOM MANAGEMENT FEATURES

- fencing around perimeter
- primary entrance / gateway
- seating - full class
- seating - dispersed (individual and small group)
- primary circulation (accessible for all abilities)
- secondary circulation pathways
- topographic features

AREAS

- gathering area
- urban meadow
- sample woodland
- lab and experiment area
- student planting beds
- rain garden / dry stream bed
- digging area

SMALLER ELEMENTS, TEACHING TOOLS AND SITE FURNISHINGS

- armature with crossbeam
- poles for teaching tools
- table work surface
- water source / spigot
- water element / rain collection barrel or cistern
- storage container (lockable)
- a variety of surface materials
- tree trunks, logs & stumps (different species types for seating and demonstration of decomposition)
- large boulders
- small flat rocks (to protect worm & insect habitat)
- bulletin board, display board
- whiteboard / black board
- site map / signs
- leaf collection cage
- green technology demonstrations
- recycled materials
- artwork elements
- maintenance tools, and storage location
Acknowledgements

We also wish to thank all the educators, organizers and landscape architects who worked with the Boston Schoolyard Initiative to continually improve the outdoor classroom model and this guide. It was truly a collaborative effort. Developers of the first Outdoor Classroom Pilot Projects and early design pioneers include:

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